C L A I M S

1. An RNA molecule with catalytic activity comprising at least one modified nucleoside, wherein the hydroxy group at the 2'-position of the ribose sugar is replaced by a modifier group, selected from halo, sulfhydryl, azido, amino, monosubstituted amino and disubstituted amino groups.

2. RNA according to claim 1, wherein the modifier group is a halo or an amino group.

3. RNA according to claim 1 or 2, wherein the halo group is a fluoro group.

4. RNA according to claim 1, wherein the catalytic activity comprises at least one of the group consisting of nucleotidyl transferase, dephosphorylase, deoxyribonuclease, and sequence specific endoribonuclease activities.

5. RNA according to claim 4, wherein the catalytic activity comprises a sequence specific endoribonuclease activity.

6. RNA according to claim 5, wherein it is a hammerhead ribozyme or a hairpin RNA.

7. RNA according to any of the preceding claims, wherein the nucleotide base attached to the modified ribose sugar is selected from the group consisting of bases naturally occuring in RNA and substituted bases.

8. RNA according to claim 7, wherein the substituted nucleotide base is selected from the group consisting of xanthine, hypoxanthine, 2,6-diamino purine, 2-hydroxy-6-mercaptopurine and purine bases substituted at the 6-position with sulfur or pyrimidine bases substituted at the 5-position with halo or C_1-C_5 alkyl groups.

9. RNA according to claim 7, wherein the nucleotide base attached to the modified ribose sugar is a base naturally occuring in RNA.

10. RNA according to claim 9, wherein the nucleotide base attached to the modified ribose sugar is a pyrimidine base.

11. RNA according to any of the preceding claims, wherein all nucleotide bases of one specific kind are attached to a modified ribose sugar.

12. RNA according to claim 11, wherein all uracil nucleotide bases are attached to a modified ribose sugar.

13. RNA according to claim 11, wherein all cytosine nucleotide bases are attached to a modified ribose sugar.

14. RNA according to any one of the claims 1 - 10, wherein all nucleotide bases of two specific kinds are attached to a modified ribose sugar.

15. RNA according to claim 14, wherein all cytosine and uracil nucleotide bases are attached to a modified sugar.

16. RNA according to any of the claims 11-15, wherein the modified ribose sugar is comprising a 2'-fluoro or a 2'-amino group.

17. RNA comprising the nucleotide sequence E2:
5'-GGG(2'-FU)CC(2'-FU)C(2'-FU)GA(2'-FU)GAGGCCG
(2'-FU)(2'-FU)AGGCCGAAAC(2'-FU)CC-3'
wherein 2'-FU represents 2'-deoxy-2'-fluorouridine monophosphate.

18. RNA comprising the nucleotide sequence E3:
5'-GGG(2'-NH_2U)CC(2'-NH_2U)C(2'-NH_2U)GA(2'-NH_2U)
GAGGCCG(2'-NH_2U)(2'-NH_2U)AGGCCGAAAC(2'-NH_2U)CC-3'
wherein 2'-NH_2U represents 2'-deoxy-2'-aminouridine monophosphate.

19. RNA according to any of the claims 1 to 10, comprising a selective modification pattern based on the structural characteristics of the molecule.

20. RNA according to claim 19, wherein nucleotides at hypersensitive sites for ribonucleases are modified.

21. RNA according to any of the preceding claims, further comprising at least one modified internucleotidic phosphodiester linkage.

22. RNA according to claim 21, wherein the modified phosphodiester linkage is a phosphorothioate group.

23. RNA according to claim 21 or 22, wherein at least the 5'-terminal phosphodiester linkage is modified.

24. RNA according to any of the claims 21 - 23, wherein at least the 3'-terminal phosphodiester linkage is modified.

25. RNA according to any of the claims 21 - 24, wherein the 5'-terminal phosphodiester linkage and the last three 3'-terminal phosphodiester linkages are modified.

26. Process for the synthesis of an RNA molecule with catalytic activity, comprising:
incorporating into an RNA chain at least one modified nucleotide, wherein the hydroxy group at the 2'-position of the ribose sugar is replaced by a modifier group, selected from halo, sulfhydryl, azido, amino, monosubstituted amino and disubstituted amino groups.

27. Process according to claim 26, wherein the modifier group is a halo or an amino group.

28. Process according to claim 26 or 27, wherein the halo group is a fluoro group.

29. Process according to claim 27 or 28, wherein the synthesis of the RNA chain is carried out by chemical synthesis from nucleotide precursors on solid support, removing the RNA product from said solid support and purifying the removed RNA product.

30. Process according to claim 27 or 28, wherein the synthesis of the RNA chain is carried out by chemical synthesis from nucleotide precursors in solution and purifying the RNA product.

31. Process according to claim 29 or 30, wherein the respective phosphoramidites or H-phosphonates are used as nucleotide precursors.

32. Process according to any of the claims 29 - 31, wherein the amino modifier group is incorporated in to an RNA chain in form of a trifluoroacetyl amido group, and the trifluoroacetyl protecting group is subsequently removed by treatment with ammonia.

33. Process according to any of the claims 26 - 32, further comprising:
incorporating into an RNA chain at least one modified internucleotidic phosphodiester linkage.

34. Process according to claim 33, wherein the modified phosphodiester linkage is a phosphorothioate group.

35. Process according to any of the claims 26 - 28, wherein the synthesis of the RNA chain is carried out by transcription from a nucleic acid template by an nucleic acid polymerase.

36. Process according to claim 35, wherein the nucleic acid template is a DNA template and the nucleic acid polymerase is a DNA dependent RNA polymerase.

37. Process according to claim 36, wherein the DNA dependent RNA polymerase is selected from the group, consisting of T7, T3 and SP6 polymerase.

38. Process according to claim 37, wherein the DNA dependent RNA polymerase is T7 polymerase.

39. Process according to any of the claims 35 - 38, wherein the modifier group is halo group and the synthesis of the RNA chain is carried out in presence of Mn^{2+} ions.

40. Process according to any of the claims 35 - 38, wherein the modifier group is a amino, monosubstituted amino, or disubstituted amino group and the synthesis of the RNA chain is carried out in presence of Mg^{2+} ions.

41. Use of an RNA according to any of the claims 1 - 25 a therapeutic agent or a biocatalyst.

42. Therapeutic agent comprising as active ingredient an RNA according to any of the claims 1 - 25, optionally together with convenient fillers, adjuvants, carriers and diluents.

43. Process of preparing a therapeutic agent, wherein the therapeutic agent comprises as active ingredient an RNA according to any of the claims 1 - 25, optionally together with convenient fillers, adjuvants, carriers and diluents.